



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

July 6, 1990

TO: ALL LICENSEES HOLDING OPERATING LICENSES AND CONSTRUCTION PERMITS
FOR NUCLEAR POWER REACTOR FACILITIES EXCEPT LICENSEES FOR BOILING
WATER REACTORS WITH MARK I CONTAINMENTS

SUBJECT: COMPLETION OF CONTAINMENT PERFORMANCE IMPROVEMENT PROGRAM AND
FORWARDING OF INSIGHTS FOR USE IN THE INDIVIDUAL PLANT EXAMINATION
FOR SEVERE ACCIDENT VULNERABILITIES - GENERIC LETTER NO. 88-20,
SUPPLEMENT NO. 3

This letter announces the completion of the NRC staff's Containment Performance Improvement (CPI) program. Technical insights arising from this effort for PWR containments and for BWR Mark II and Mark III containments are being forwarded via this letter for use in licensee efforts as part of the Individual Plant Examination (IPE) effort described in Generic Letter 88-20. No regulatory requirements have resulted from the CPI program for these containment types. Similar technical information for BWR Mark I containments was discussed in SECY 89-017, "Mark I Containment Performance Improvement Program", dated January 23, 1989, and summarized in an enclosure to Generic Letter 88-20, Supplement 1, dated August 29, 1989. The technical information may be useful to licensees during their examinations of their plants for vulnerabilities to severe accidents.

Four specific insights are believed by the staff to be important enough to bring to the attention of licensees for use as they determine appropriate in the IPE for the plant types to which they apply. These insights are briefly summarized below. As final technical reports providing additional detail are published, they will be made available to all licensees.

Licensees should bear in mind that the insights listed below are not all inclusive and unique plant features may exist that also warrant consideration in the IPE. Licensees should search for possible "outliers" that might be missed absent a systematic search in areas of both mitigation and prevention.

Mark II Containments

For events where inadequate containment heat removal could cause core degradation, additional containment heat removal capability using plant-specific hardware procedures is expected to be considered as part of the IPE process. Potential methods of removing heat from containment include, but are not limited to, using a hardened vent or other means of improving reliability of suppression pool cooling. It is expected that the negative as well as the positive benefits of the enhanced containment heat removal capability will be considered. For example, for those events where venting is initiated after core melt and subsequent vessel failure have occurred, the benefit of scrubbing of fission products cannot be assured for Mark II containments to the same degree as in Mark I plants. This is because molten core materials on the floor of the containment may fail downcomers or drain lines and result in suppression pool bypass.

In addition, the Mark I improvements contained in Supplement 1 to Generic Letter 88-20 dated August 29, 1989 are expected to be considered for applicability to Mark II containments.

Mark III Containments

A potential vulnerability for Mark III plants involves station blackout, during which the hydrogen igniters would be inoperable. Under these conditions, a detonable mixture of hydrogen could develop which could be ignited upon restoration of power. Licensees with Mark III containments are expected to evaluate the vulnerability to interruption of power to the hydrogen igniters as part of the IPE. A backup power supply meeting the requirements for the Alternate AC option of the Station Blackout Rule would be one method of ensuring uninterrupted operation of the hydrogen igniters.

In addition, the Mark I improvements contained in Supplement 1 to Generic Letter 88-20 dated August 29, 1989, as well as containment heat removal as discussed for Mark II containments, are expected to be considered for applicability to Mark III containments.

PWR Ice Condenser Containments

The same situation could occur in ice condenser containments as in Mark III containments relative to hydrogen detonations following restoration of power. Therefore, licensees with ice condenser containments are expected to evaluate the vulnerability to interruption of power to the hydrogen igniters as part of the IPE.

PWR Dry Containments

Depending on the degree of compartmentalization and the release point of the hydrogen from the vessel, local detonable mixtures of hydrogen could be formed during a severe accident and important equipment, if any is nearby, could be damaged following a detonation. In addition, smaller subatmospheric containments may develop detonable mixtures of hydrogen on a global basis. Licensees with dry containments are expected to evaluate containment and equipment vulnerabilities to localized hydrogen combustion and the need for improvements (including accident management procedures) as part of the IPE.

It should be noted that currently available computer codes have been shown to overestimate mixing of hydrogen in the containment and may not be adequate to evaluate the potential for high local concentrations of hydrogen (e.g., ANS Proceedings, 1989 National Heat Transfer Conference, August 6-9, 1989, Philadelphia, PA, Page 233-241). Thus any analyses should be supplemented by judgement as to the adequacy of the results and consideration of the impact of higher than predicted hydrogen concentration due to stratification.

Given an estimate of local concentration of hydrogen, NUREG/CR-5275 provides a discussion of one method that has been used to evaluate the potential for local hydrogen detonations.

This generic letter provides information that may assist licensees in performing their Individual Plant Examination pursuant to Generic Letter 88-20. It does not contain any new requirements and no reply to this generic letter is required.

Generic Letter 88-20 was issued pursuant to 10 CFR 50.54(f). A copy of the 10 CFR 50.54(f) evaluation which justified issuance of Generic Letter 88-20 is in the Public Document Room. This supplement does not change the scope of Generic Letter 88-20. Therefore, there is no additional burden associated with this letter, and a separate OMB clearance is not required.

Sincerely,

A handwritten signature in black ink, appearing to read 'James G. Partlow', is written over the typed name.

James G. Partlow
Associate Director for Projects
Office of Nuclear Reactor Regulation

Enclosure:
List of Most Recently Issued Generic Letters